

MEMO

DATE: February 3, 2005

TO: Transportation & Communications Committee

FROM: Nancy Pfeffer, Sr. Regional Planner, 213-236-1869, pfeffer@scag.ca.gov

Nancy

SUBJECT: Health Effects of Diesel Air Pollution

SUMMARY:

Dr. Ed Avol, a Professor in the Environmental Health Division at the Department of Preventive Medicine, USC Keck School of Medicine, will provide a presentation on recent research into the public health effects of air pollution from diesel vehicle engines. Dr. Andrea Hricko of USC has previously presented this information to the SCAG Energy & Environment Committee. A copy of her Urban Policy Brief is attached.

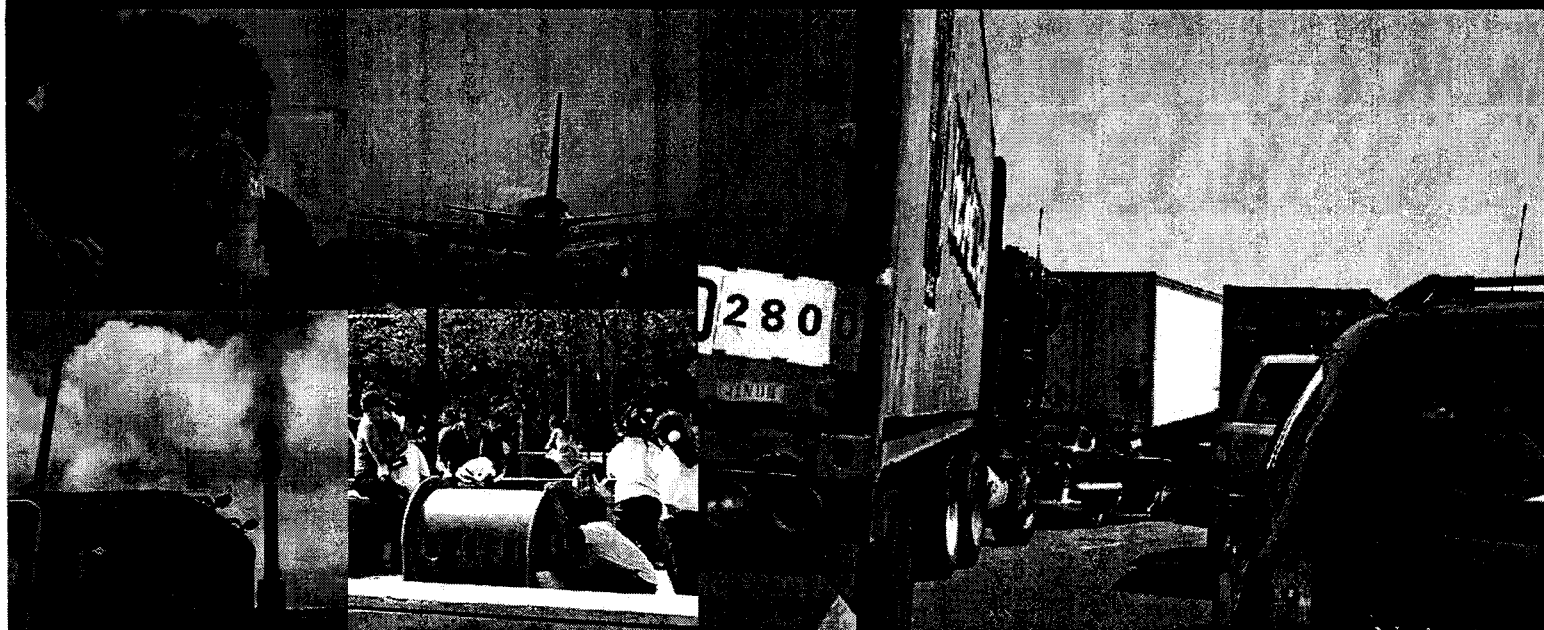
BACKGROUND:

The USC Keck School of Medicine has been conducting a long-term Children's Health Study that has recently produced some significant findings. In September 2004, the New England Journal of Medicine published results indicating that current levels of air pollution have chronic adverse effects on lung development in children between 10 and 18 years of age. In the study, public health data were correlated with measured concentrations of fine particulate matter (PM_{2.5}) at various locations around the South Coast Air Basin. The associations with health effects seen in the study were primarily from pollutants arising from mobile sources. Earlier studies have also linked health effects such as asthma and increased strokes in adults with proximity to freeways. These studies have direct implications for transportation projects and land use planning throughout the SCAG region.

UNIVERSITY OF SOUTHERN CALIFORNIA URBAN INITIATIVE

Road To An Unhealthy Future For Southern California's Children

Andrea M. Hricko



URBAN
POLICY
BRIEF

Urban Initiative Public Policy Briefing
© 2004 Urban Initiative & Andrea Hricko

FOR FURTHER INFORMATION:

USC URBAN INITIATIVE
3470 TROUSDALE PARKWAY, WPH 604
UNIVERSITY OF SOUTHERN CALIFORNIA
LOS ANGELES, CA 90089-4036
EMAIL: urban.initiative@usc.edu
www.usc.edu/urban

SOUTHERN CALIFORNIA ENVIRONMENTAL
HEALTH SCIENCES CENTER
KECK SCHOOL OF MEDICINE OF USC
1540 ALCAZAR STREET, CHP 236
LOS ANGELES, CA 90033-9013
EMAIL: scehsc@usc.edu
www.usc.edu/medicine/scehsc



ROAD TO AN UNHEALTHY FUTURE FOR SOUTHERN CALIFORNIA'S CHILDREN

Andrea M. Hricko^{1,2}

URBAN INITIATIVE POLICY BRIEF

Reporting on results of a USC study of air pollution's impacts on children and some policy issues this study raises.

For more than 10 years, investigators at the Keck School of Medicine of USC have studied air pollution to determine its effects on children. Results from the USC Children's Health Study (CHS) show that children in Southern California's more-polluted communities suffer reduced growth of lung function, asthma exacerbations, more school absences, and new onset asthma. Many of the effects are linked to pollution from mobile sources — cars, trucks, ships, planes, trains, and other gasoline- and diesel-powered equipment. Significant strides have been made in past decades to implement emission control strategies, but the number of mobile sources keeps increasing and smog levels have started to rise again over the past five years. Increasing pollution may be compounded by regulatory delays because the federal government has just postponed deadlines to clean the air from 2010 to 2021.

Based on this evidence, this policy brief reviews the CHS results and examines the number of children who may be impacted by delays in controlling air pollution and the geographic areas with the highest pollution levels. It also

discusses the difficulty local air regulators have in protecting the region's interests in clean air against conflicting global and federal priorities. Finally, this brief considers regulatory measures to protect children's health by using available technology to reduce mobile source pollution as well as policy and planning solutions aimed at placing a higher priority on health when key development decisions are made.

Air pollution harms children's health

In 1993, USC investigators began enrolling 6,000 children from 12 communities in the CHS to determine whether long-term exposure to outdoor air pollution affected respiratory health. A decade later, the CHS has generated compelling evidence that the lungs of children living in

¹Andrea M. Hricko, MPH, is Director, Community Outreach and Education, Southern California Environmental Health Sciences Center (SCEHSC), and Associate Professor, Department of Preventive Medicine, Keck School of Medicine of USC. The SCEHSC and the Children's Health Study are both directed by John M. Peters, M.D., Hastings Professor at the Keck School of Medicine.

²With thanks to the other authors of "Breathless in Los Angeles," described below, and to Michael Jerrett and Jim Gauderman (reviewers) and Amy Tam (manuscript assistance).

FIGURE 1:

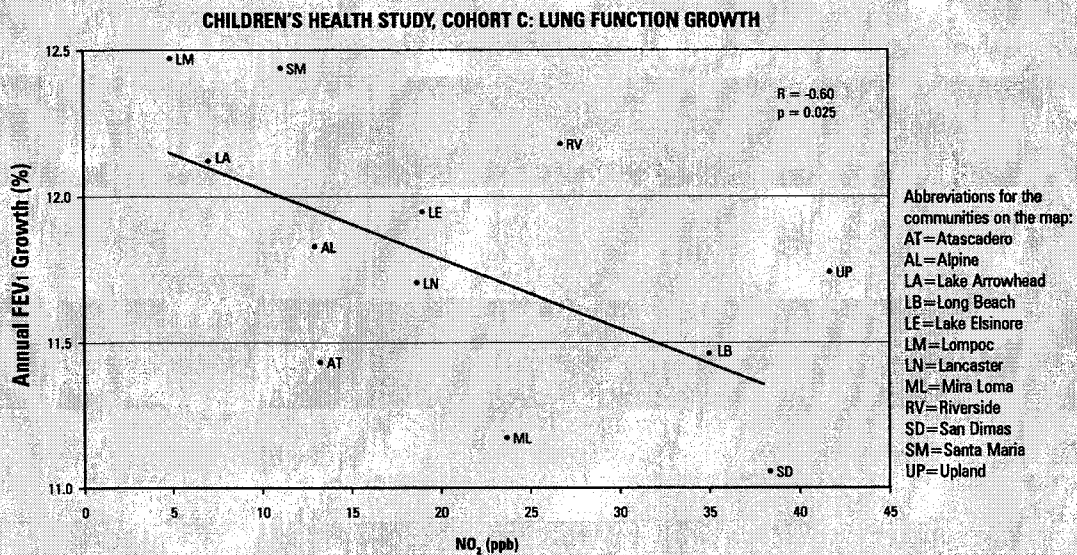
KEY RESULTS OF THE USC CHILDREN'S HEALTH STUDY

Children in the more-polluted communities have:

- ▶ Reduced lung function growth (their lungs grow more slowly)
- ▶ Improvement in lung function if they move to a less polluted community
- ▶ More school absences from acute respiratory problems when ozone levels go up
- ▶ Asthma exacerbation (in areas with more traffic-related pollutants)
- ▶ More cases of newly diagnosed asthma (in areas with high ozone levels)

FIGURE 2:

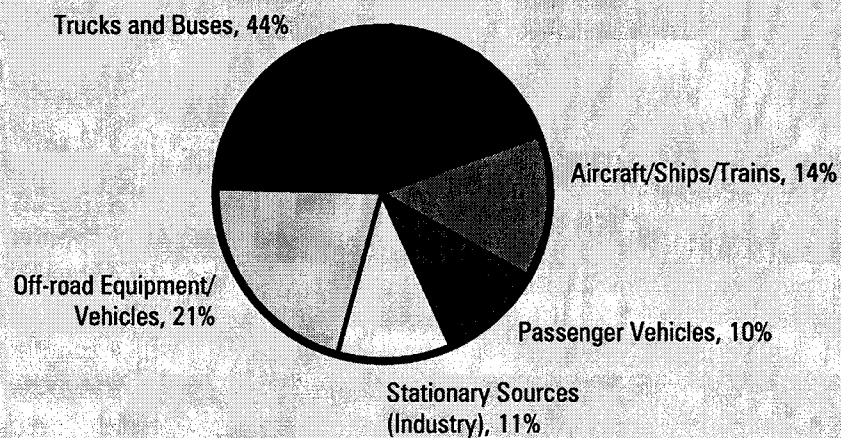
GROWTH OF LUNG FUNCTION DECREASES AS TRAFFIC-RELATED AIR POLLUTION INCREASES



Source: Children's Health Study

FIGURE 3:

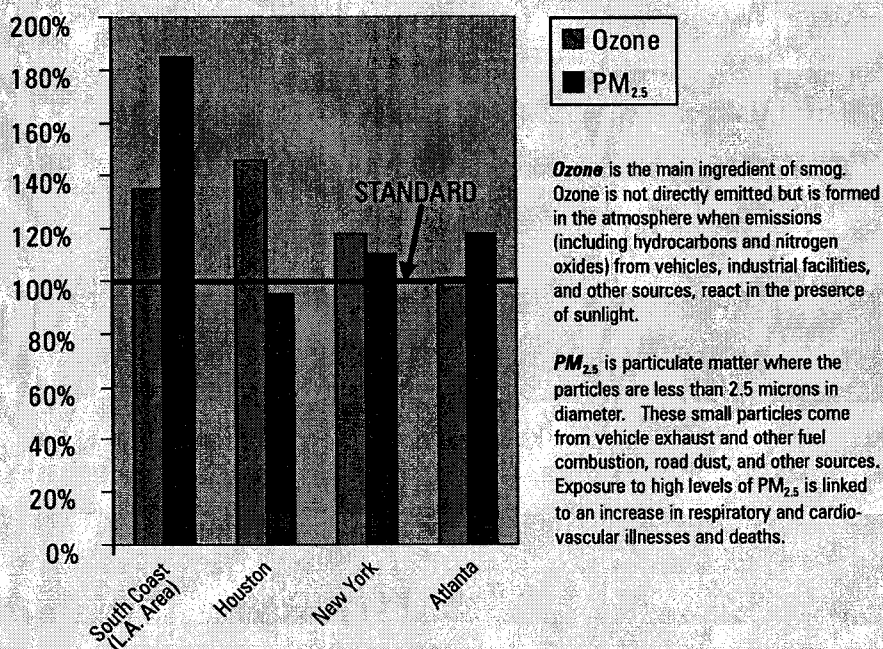
MOBILE SOURCES ARE THE MAJOR CONTRIBUTORS TO OXIDES OF NITROGEN IN THE REGION'S AIR



Source: South Coast Air Quality Management District, Air Quality Management Plan, 2003.

FIGURE 4:

MAXIMUM POLLUTANT CONCENTRATIONS AS PERCENT OF FEDERAL STANDARDS SOUTH COAST AIR BASIN COMPARED TO OTHER URBAN AREAS (2002)



Source: AQMD Air Quality Standards Compliance Report, 2003.

more-polluted communities develop more slowly and that these deficits probably have long-term health and social consequences.³ [Figs. 1 & 2] CHS results also show that children with asthma get sicker when exposed to higher levels of pollutants associated with traffic emissions [Fig. 3], such as particulate matter (PM) and nitrogen dioxide.

In addition, the CHS shows that (1) in higher ozone communities, children with significant outdoor activity develop asthma more often than children in less polluted communities, and (2) when ozone levels go up, children develop more acute respiratory problems, causing them to miss school. These absences, in turn, create an added economic burden for caregivers,⁴ and for school districts which lose per-pupil funding. They may also interfere with a child's education.

Federal government deadlines for cleaning the region's air have been delayed

The four-county region (L.A., Orange, Riverside and San Bernardino) has some of the highest levels of particulate matter (small particle pollution from exhaust, fuel combus-

tion, road dust and other sources) and ozone in the country. [Figs. 4, 5 & 6]. Ozone levels last year rose to the highest levels in the past five years. [Fig. 7]. Under a plan implemented by the South Coast Air Quality Management District (AQMD), the area had until 2010 to achieve improved air quality. But in April 2004, the U.S. Environmental Protection Agency (EPA) issued stricter ozone rules that, while they will be harder for Southern California to meet, also extended its smog cleanup deadline to 2021.

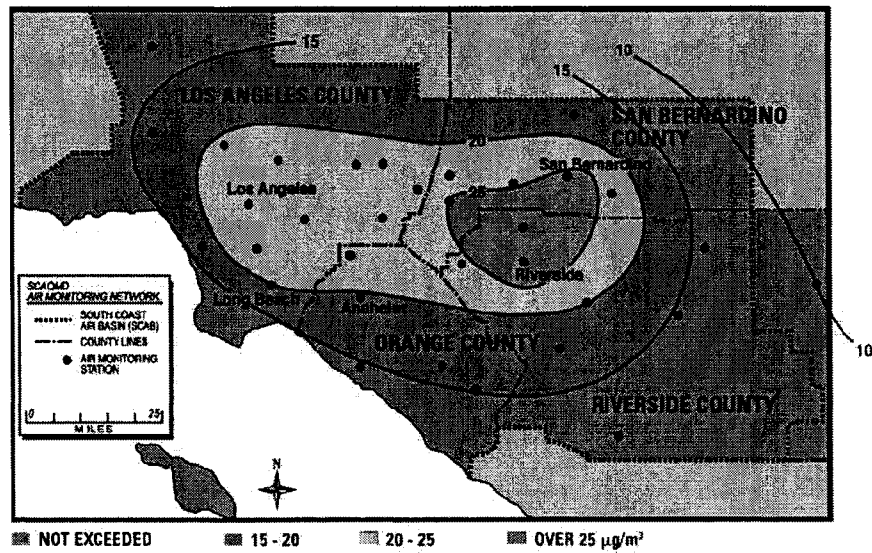
New mobile sources of pollution continue to be added

Already accommodating 16 million people, 9 million cars, and 261,000 diesel vehicles, by 2020 the four-county region of the LA metropolitan area will add several million more cars and thousands more trucks to the roads,

³ Kuenzli N, McConnell R, Bates D, Bastain T, Hricko A, Lurmann F, Avol E, Gilliland F, Peters J. Breathless in Los Angeles: the exhausting search for clean air. *Am J Public Health*. 2003 Sep;93(9):1494-9. Includes references for many of the papers reporting CHS results.

⁴ Jane V. Hall, Victor Brajer, and Frederick W. Lurmann. Economic valuation of ozone-related school absences in the South Coast Air Basin of California. *Contemporary Economic Policy*. Vol. 21, No. 4, October 2003, 407-417.

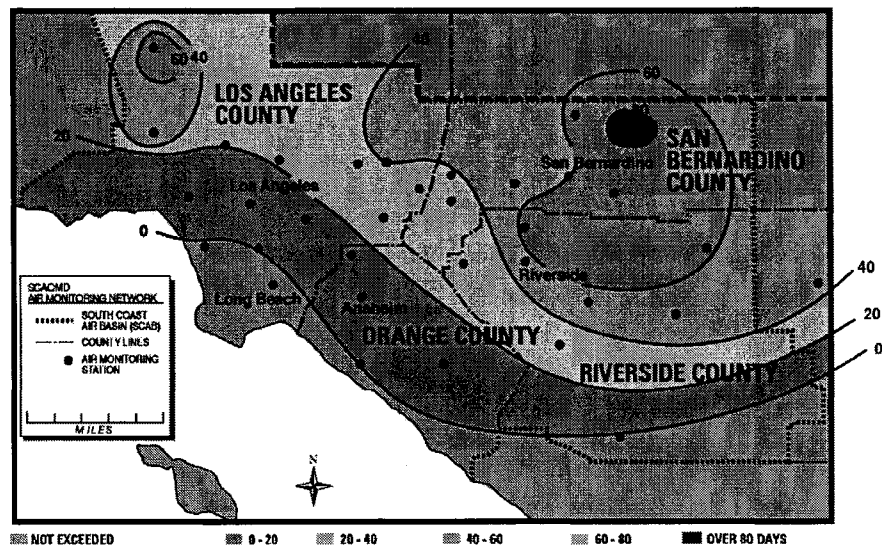
FIGURE 5:

ANNUAL AVERAGE PM_{2.5} CONCENTRATIONS, 2002 (ARITHMETIC MEAN, $\mu\text{g}/\text{m}^3$)[NOTE: THE CURRENT CALIFORNIA AIR RESOURCES BOARD STATE STANDARD IS 12 $\mu\text{g}/\text{m}^3$ AS AN ANNUAL AVERAGE]

Source: AQMD, Air Quality Standards Compliance Report, 2003.

FIGURE 6:

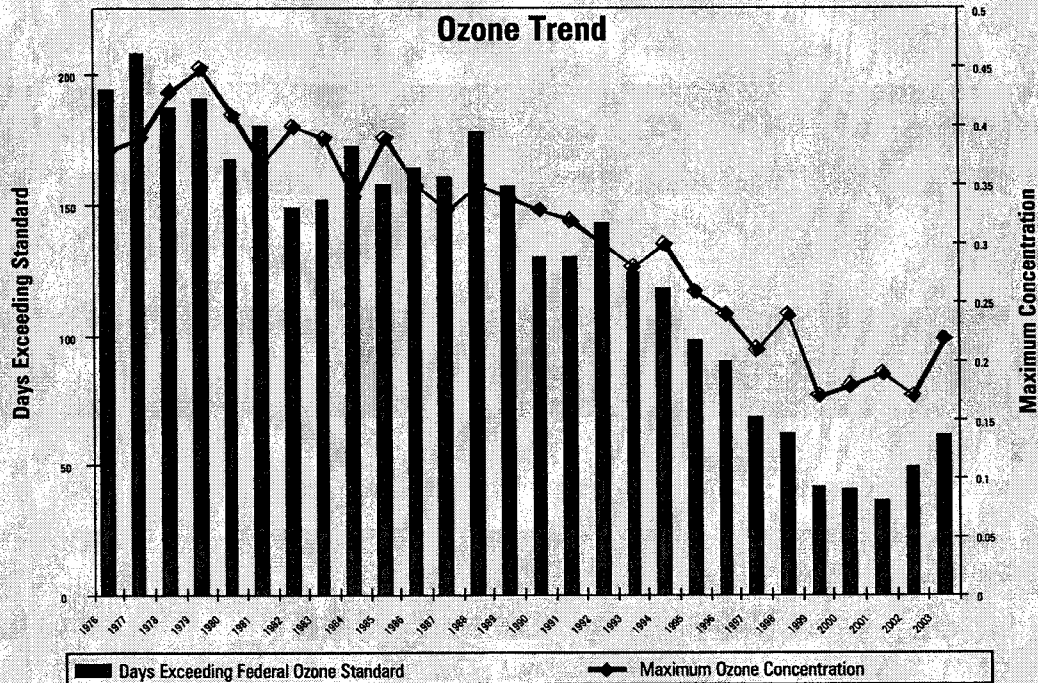
NUMBER OF DAYS EXCEEDING THE FEDERAL 8-HR OZONE AIR QUALITY STANDARD IN 2003



Source: AQMD, Air Quality Standards Compliance Report, 2004.

FIGURE 7:

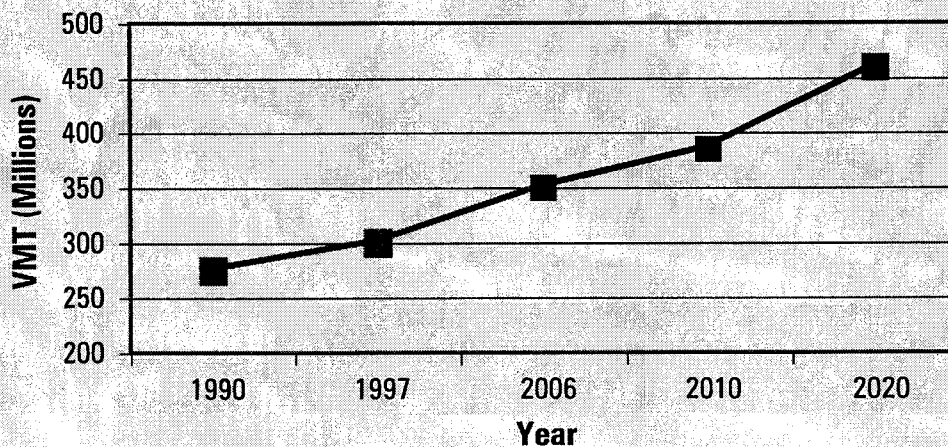
OZONE AIR QUALITY TRENDS IN THE SCAQMD (1976 - 2003)



Source: AQMD, Air Quality Standards Compliance Report, 2004.

FIGURE 8:

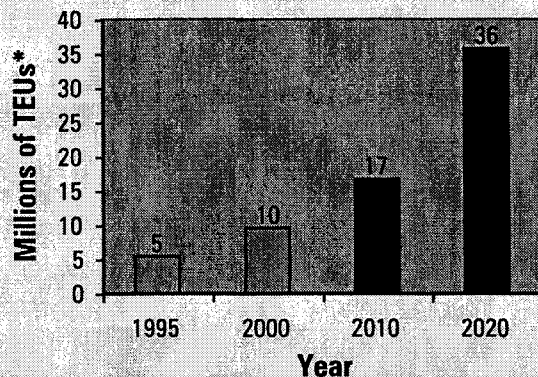
DAILY VEHICLE MILES TRAVELED (VMT) IN 4-COUNTY REGION



Source: AQMD, Air Quality Management Plan, 2003.

FIGURE 9:

CONTAINER TRAFFIC FORECAST FOR THE PORTS OF LOS ANGELES AND LONG BEACH



*TEU = a twenty-foot equivalent unit or a twenty-foot cargo container

Source: Data from Ports of Los Angeles and Long Beach, 2004.

increasing total vehicle miles traveled by 35%. [Fig. 8] In addition, the Los Angeles/Long Beach Port complex has become the world's third largest port, flooding the region with imported cargo containers [Fig. 9] transported by ships and freight trains operating on low-grade fuel along with big-rig trucks, which together emit tons of airborne pollutants. By 2025, twice as many diesel locomotives and big-rig diesel trucks will be needed to handle booming international trade, and the number of truck trips a day on the I-710 Freeway, alone, is expected to jump from 47,000 to 100,000 in 2025.⁵

Local interests to clean the air are hampered by global and federal priorities

Nearly all ships entering the two ports are foreign-flagged with their emissions virtually unregulated. Currently, locomotives and airplanes are covered by federal rules that require much less stringent emission controls than cars and trucks, even though the AQMD calls the port complex and the L.A. International Airport the region's two largest single sources of air pollution. Still more pollution will be emitted as U.S. roads open to unregulated Mexican trucks, the result of a recent Supreme Court decision upholding President Bush's authority (under free trade agreements) to allow the trucks through without any review of environmental effects. Without strict controls on these major emission sources under international and federal jurisdiction, state and local air pollution regulators are forced to require more controls on other sources, including small businesses, to reduce air pollution.

Millions of children will be at increased risk if the air is not cleaned until 2021

Some four million children younger than 18 live in the four-county region, breathing today's polluted air. CHS researchers studied adolescents who left the Los Angeles area and found that lung function growth improved in those who moved to areas with lower particle pollution. These findings strongly suggest that children currently living in more-polluted communities would derive *immediate* health benefits if the air became cleaner.

Failure to control all significant air pollution sources in the region on a tight timeline will hurt future generations, since new cars, SUVs, trucks, locomotives, and ships purchased today will spend many decades polluting the region's air. Between now and the 2021 EPA deadline for clean air, more than five million babies will be born in these counties and will be subjected to increased risk of respiratory problems from air pollution.

Health effects may be preventable with cleanest available technology

The AQMD director recently stated that the Los Angeles basin's air can be cleaned of mobile-source diesel pollution only by "deploying the cleanest commercially-available technologies as soon as possible."⁶ For all vehicles, the region must (1) develop cleaner, low-emission engines or

⁵ Meyer, Mohaddes Associates, Inc. *Draft Port of Los Angeles Baseline Transportation Study*. December 2003.

⁶ Wallerstein, Barry. A local air district's view of diesel emissions. Presentation to the California Air Pollution Control Officer's Association Conference on Diesel. January 27, 2004.

FIGURE 10:

SOUTHERN CALIFORNIA REGIONAL TRAFFIC TRENDS AND AIR POLLUTION LEVELS: ROAD TO AN UNHEALTHY FUTURE?

| 2004 Children's Health Study Results: Today's Air in More-Polluted Communities | Projections (constraints for reducing pollution) | Air Pollution Levels | Key control strategies needed to reduce traffic emissions | Steps to Protect Health |
|--|---|--|--|--|
| <ul style="list-style-type: none"> ↓ Children's lung function growth ↑ Rate of school absences from acute respiratory problems after pollution levels are high ↑ Rate of asthma exacerbations ↑ Economic costs to care for children who are sick and miss school | <ul style="list-style-type: none"> ↑ Population - 22% increase by 2020 ↑ Cars and trucks - 35% increase by 2020 in vehicle miles traveled <ul style="list-style-type: none"> ↑ Capacity of freeways ↑ International Trade - 300% increase in imported cargo containers by 2025 <ul style="list-style-type: none"> ↑ 200% increase in number of diesel locomotives ↑ 240% increase in number of big-rig trucks on I-710 and other freeways ↑ Number of port terminals ↑ Number of cargo warehouses ↑ Size of rail yards ↑ Number of trucks from Mexico ↑ Capacity of Airports | <ul style="list-style-type: none"> ↑ Ozone levels on the rise during past 5 years; among highest in the U.S. ↑ Particle (PM₁₀) levels from on-road mobile sources will increase 4% by 2030, according to the Regional Transportation Plan of the Southern California Association of Governments (April 2004) ↑ Particle (PM_{2.5}) levels among highest in the U.S. No projections available. Federal regulations expected to require meeting a 2014 deadline. | <ul style="list-style-type: none"> ↑ Use of alternative fuels ↑ Number of low or zero emission vehicles ↑ Fuel economy ↑ Cleanup or retrofit of existing fleets ↑ Removal of the most polluting engines ↑ Public transit ↑ Car pools ↓ Travel demand (use vehicles less) | <ul style="list-style-type: none"> ↑ Consideration of "health" in planning, land use, economic development, and transportation decisions ↑ Evaluation of health effects/ economic costs ↑ Education of public officials about the impacts of air pollution on health ↓ Emissions from mobile sources under federal and international control |

2004 **New state and federal rules expected to be implemented between 2004 - 2021 to address mobile source emissions** → 2021
DEADLINE TO CLEAN THE AIR

alternative fuels, (2) increase fuel economy, (3) clean up or retrofit existing fleets, and (4) remove the most-polluting engines from operation. Without success in these areas, other strategies to clean the air will not likely succeed.⁷ A recent Supreme Court ruling, however, prohibits the AQMD from requiring private trucking and vehicle fleet operators to purchase low-polluting vehicles, again limiting local regulators who recognize the seriousness of Southern California's air pollution problem.

Transportation and land use decision makers need to integrate concerns about air pollution's adverse health impacts and related health costs

Government agencies, planners and elected officials are striving to expand the four-county transportation infrastructure. They are pushing for expansion of freeways, rail facilities and bridges to move increasingly larger volumes of imported cargo from the ports to the rest of the country.⁸ Advocates for economic development argue that expanding international trade, the ports, and related infrastructure is critical to the region's economic growth.⁹ Yet, these discussions continue to omit significant public health considerations.

The challenge ahead is for regional planners, economists, elected officials and other decision-makers to develop an integrated approach to developing the region's infrastructure, with a high priority on protecting health.

This requires a proactive effort to develop a true dialogue with scientific researchers, air-pollution regulators, and impacted communities so that the health and well-being of the region's children does not fall victim to political and economic interests. Southern California might look to efforts of other regions that are incorporating guiding principles for sustainable transportation into their planning to reduce negative impacts on residents.¹⁰ Without a visionary public health regulatory policy to reduce air pollution from *all* significant mobile sources — including ships, planes, locomotives, and some trucks under currently relaxed international and federal regulations — we are on the road to an unhealthy future for millions of Southern California children. [Fig. 10]

⁷ Additional policy strategies, regulatory actions, and behavioral changes that could reduce air pollution, such as reducing travel demand, improving vehicle inspections, investing in public transit, and limiting urban sprawl can be found in Ref. #3.

⁸ See, for example, Southern California Association of Governments, Goods Movement Program White Paper, January 2002.

⁹ See, for example, Los Angeles Economic Development Corporation, International Trade Trends and Impacts: The Southern California Region, 2003 Results and 2004 Outlook, May 2004.

¹⁰ See, for example, OECD International Conference, Vancouver, Canada, 24-27 March, 1996. Guiding Principles for Sustainable Transportation. <http://www.gdrc.org/uem/sustran/sustran-principles.html>
 Resource: Hricko A and Markuze K. "A Breath of Air: What Pollution is Doing to our Children," a 28-minute documentary video describing results of the CHS. Available in English and Spanish (free) from the California Air Resources Board: <http://www.arb.ca.gov/research/health/school/school.htm>

Acknowledgements:

Funding for this USC Policy Brief was provided by the USC Urban Initiative, with additional faculty support from the National Institute of Environmental Health Sciences (NIEHS Grant 5 P30 ES07048-9).

The USC Children's Health Study, on which this Policy Brief reports, was funded by the California Air Resources Board, with additional support from the NIEHS, U.S. EPA, and the Hastings Foundation.

Cover Photo Credits:

Boy: Kris Smith, from "A Breath of Air" video

Coliseum Park: Photo taken by Jennifer Wolch

Diesel Truck: Courtesy of the "California Air Resources Board"

Ports: Photo taken by Ed Avol

Trucks and Cars: Photo taken by Andrea Hricko

Art Direction/Design: USC School of Architecture Office of Publications.